

## ABSTRACT OF THE DISCLOSURE

The invention includes solder materials having low concentrations of alpha particle emitters, and includes methods of purification of materials to reduce a concentration of alpha particle emitters within the materials. The invention includes methods of reducing alpha particle flux in various lead-containing and lead-free materials through purification of the materials. The invention also includes methods of estimating the fractionation of a low concentration of one or more alpha particle emitters during purification of a material.